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ABSTRACT

This survey gathered data on the salaries, characteristics, locations, and assignments of individual teachers, making it possible to present three kinds of information on salaries and salary structures of United States teachers: (1) average salaries for public school teachers by selected teacher background characteristics, qualifications, location, and assignment; (2) relationships of salary to teaching experience and degree level, the two factors that figure most prominently in local teacher salary schedules in the United States; and (3) differences in salary profiles by race, sex, geographical region, and size of school district. (JD)

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NATIONAL CENTER FOR EDUCATION STATISTICS

Survey Report June 1988

Salary Structures for Public School Teachers, 1984-85

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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Background and Issues

Teacher compensation is a perennial item on the education policy agenda, but concerns about teacher quality and teacher supply have made it an increasingly salient item today. [1] Numerous critics have implicated the present teacher salary structure as one of the sources of poor performance by our Nation's public schools. According to the National Commission on Excellence in Education, the level of salaries in teaching is too low to attract enough talented college graduates to the field; the salary structure offers few incentives for high-quality teaching or for good people to stay in the profession; and the lack of differentiated pay leads to teacher shortages in fields like mathematics and science where the competition for talent is most intense. The situation calls for salaries that are "competitive, market-sensitive, and performance-based,"[2] says the Commission.

More recently, the Carnegie Task Force on Teaching as a Profession, noting both concerns about unsatisfactory teacher quality and the prospect of inadequate supply, has

Elementary
and Secondary
Education Statistics
Division

[1]This survey report was written by Dr. Stephen M. Barro of SMB Economic Research, Inc., for the Center for Education Statistics. The computations were performed by Decision Resources Corporation.

[2]National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform*, Washington, D.C., April 1983.

NOTE: The name of the Center for Education Statistics (CES) has been changed to the National Center for Education Statistics (NCES). Because this report was written before the name was changed, all references are to the Center for Education Statistics or CES.s

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recommended sharply higher pay ranges, changes in the methods of determining teacher pay, and the development of performance-based reward systems.[3] Reinforcing these findings, analysts of teacher supply and demand have warned that teacher shortages may soon emerge or at least that efforts to raise quality will be thwarted, unless salaries and other conditions of teaching are substantially improved.[4] These alarms, predictions, and recommendations have lent new urgency to policymaking on teacher salary issues.

Stimulated in part by the reform commission reports, but also by their own growing uneasiness about the difficulty of hiring and retaining talented teachers, some States and localities have been working to try to improve their teacher compensation systems. Several States have recently appropriated funds for larger than usual pay raises, and some have imposed minimum statewide salary standards on local districts. A few have enacted into law, and are now implementing, career ladder plans or other performance-based incentive pay systems. Others are trying alternative strategies for expanding and upgrading their teaching forces, such as opening the profession to entrants without traditional teacher training. But other States have yet to implement, or even formulate, coherent responses to the interwoven teacher supply, quality, and compensation issues.

The Federal role in these policy areas is indirect. Federal agencies have no authority to set teacher salaries or standards. However, the Congress, responding to concerns about inadequate quality and shortages, has provided some limited financial support for teacher training in mathematics and science, and it is possible that additional Federal aid for such activities may be forthcoming.

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[3]Carnegie Forum on Education and the Economy, Task Force on Teaching as a Profession, A Nation Prepared: Teachers for the 21st Century, May 1986.

[4]See, e.g., Linda Darling-Hammond, Beyond the Commission Reports: The Coming Crisis in Teaching, The RAND Corporation, R-3177-RC, July 1984.

Perhaps more important, the U.S. Department of Education, even though lacking a direct role in setting teacher compensation policies, has urged States and localities to adopt some of the aforementioned reforms--notably higher pay and performance incentives. In addition, the Department has become more active in organizing the research and data collection activities needed to support policymaking on teacher compensation and other teacher-related issues.[5]

A serious obstacle to effective Federal, State, or local policymaking in the area of teacher compensation is that the existing information base is weak. Both relevant research findings and basic descriptive data on the current system are in short supply. On the research front, little is known about how proposed changes in compensation systems would affect teacher quality or supply. For example, there are no reliable findings about relationships between salary levels and the quality of applicants for teaching positions. Nor are there findings about such relatively simple matters as the degree to which teacher retention depends on rewards for seniority. Lacking such knowledge, policymakers must proceed largely by trial and error. Experts can offer little research-based advice on how large a pay increase is "enough;" whether additional dollars should be channeled into higher base salaries, larger experience increments, or across-the-board increases in pay; or whether performance-based pay structures are desirable and, if so, how they should be designed.

Even basic descriptive data on the current salary system have been lacking. At the national level, the only salary data that have been available in recent

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[5]The Schools and Staffing Survey (SASS) is an important example of a new data collection activity recently initiated by the Center for Education Statistics. Designed under a contract with the Rand Corporation and implemented through an interagency agreement with the Bureau of the Census, SASS was implemented in January 1988 and will provide richer data on teacher supply, demand, quality, and compensation than have hitherto been available.

years are average salary estimates by State, compiled by the National Education Association and the American Federation of Teachers. No data at all have been compiled on teacher salary structures. That is, no aggregative (State or national) information is at hand on how salaries are related to experience, training, and teaching duties, which are key factors in local district salary schedules, or on how salary levels and schedules vary among different types of communities, schools, and teachers. Without such data, it is difficult not only to deal with the kinds of behavioral issues raised above but also to address such straightforward questions as how much a given change in the salary structure is likely to cost.

The 1984-85 Public School Survey of the Center for Education Statistics (CES) offers the opportunity to make modest progress in filling these information gaps. Specifically, by providing data on the salaries, characteristics, locations, and assignments of individual teachers, the survey makes it possible to present three kinds of information on salaries and salary structures of U.S. public school teachers:

1. Average salaries for public school teachers by selected teacher background characteristics, qualifications, location, and assignment;
2. Relationships of salary to teaching experience and degree level, the two factors that figure most prominently in local teacher salary schedules in the United States; and
3. Differences in salary profiles by race, sex, geographical region, and size of school district.

AVERAGE SALARIES

The average 1984-85 primary contract salary reported by respondents to the 1984-85 Public School Survey is $22,451.[6] This figure is lower by about $1,100 (for reasons unknown) than the NEA's estimate of $23,534 for the average salary of U.S. classroom teachers in 1984-85.[7] As can be seen from table 1, the average reported salary (primary contract) is about 12.5 percent higher for males ($24,293) than for females ($21,594).[8] It is slightly higher for white non-Hispanics ($22,512) than for blacks ($21,962); slightly higher also, but not significantly so, for white non-Hispanics than for Hispanics ($21,977); and higher for Asians ($24,404) than for any of the aforementioned ethnic groups. These and other salary differentials cited in this section are illustrated by the bar charts in figure 1. As shown later, the intergroup differences in average pay stem in large part from differences in the geographical distributions, the training and experience distributions of male and female and white and nonwhite teachers, or both.

The importance of geographical variations in salaries is clear in table 1. Average salaries are highest in the Northeast ($24,816), next highest in the West ($23,922), just above the national average in the Midwest ($22,996),

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[6]This figure rises to $22,766 if supplemental contract salaries are included. However, because supplemental contract salaries are small (a mean of only $315 per teacher) and because such supplements are generally paid for work outside the regular school year, it was decided not to include them in this analysis. All subsequent salary figures, therefore, refer to primary contract salaries only.

[7]This figure appears in National Education Association, Estimates of School Statistics, 1985-86, Washington, D.C., 1986. The NEA national estimate is based on data provided by State authorities and, in some cases, on the NEA's own extrapolations. It is not directly comparable to the estimate reported here, which is based on a sample survey of individual teachers.

[8]Unless otherwise stated, all salary differences cited in this bulletin are statistically significant at least at the .05 probability level. See the "Technical Notes" section for further information on tests of statistical significance.

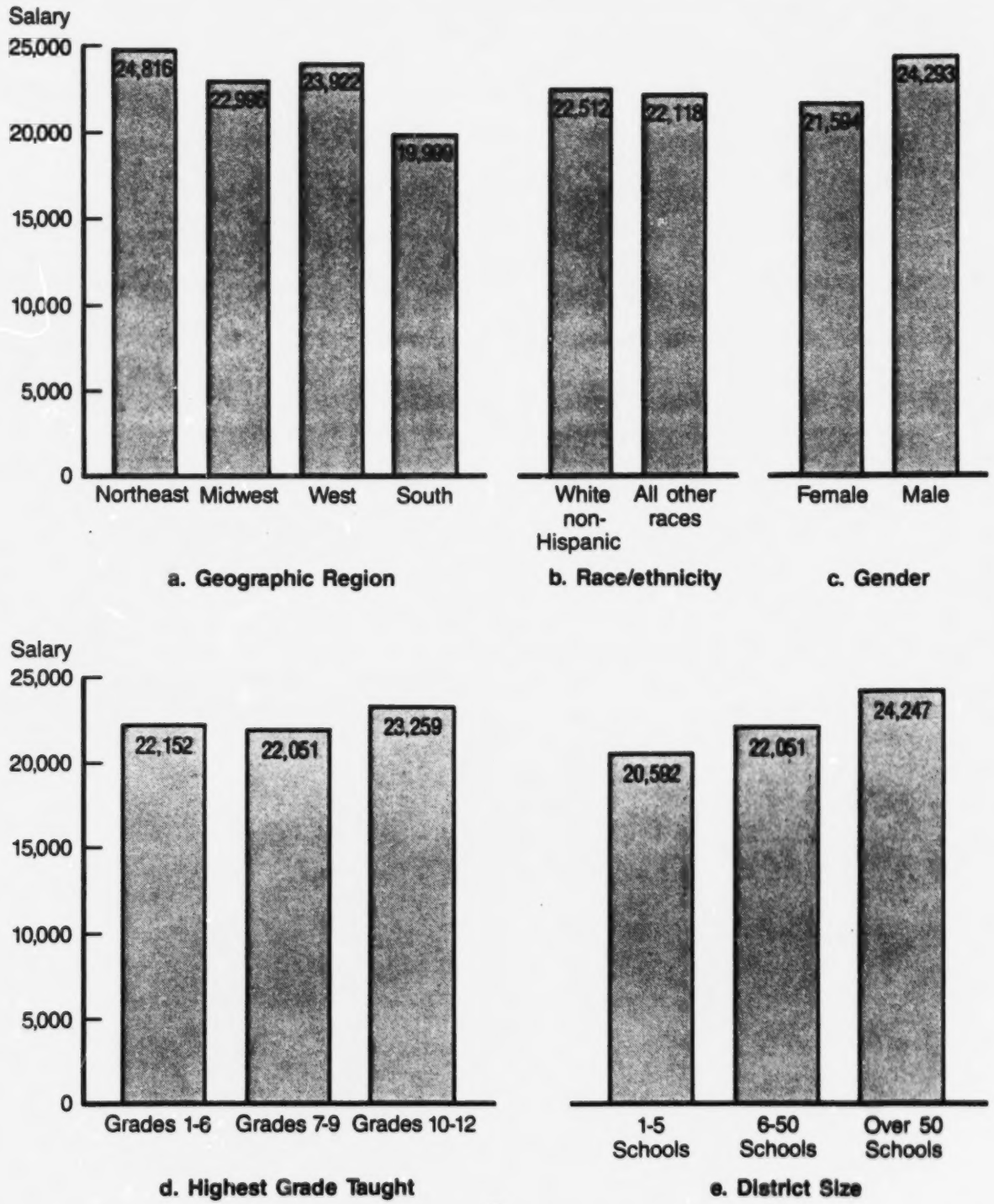
TABLE 1

Average Primary Contract Salaries of Full-time Public School Teachers, by Selected Teacher Characteristics: 1984-85

Category of Teachers	Primary Contract Salary	Standard Error	Number of Observations
All Teachers	$22,451	105	8,568
Males	24,293	160	3,198
Females	21,594	133	5,370
White, Non-Hispanic	22,512	117	7,175
Black, Non-Hispanic	21,962	245	997
Hispanic	21,977	688	185
Asian/Pacific Islander	24,404	686	116
American Indian	19,388	1,616	37
Race/ethnicity unknown	22,426	1,337	58
Northeast	24,816	309	1,437
Midwest	22,996	214	2,081
West	23,922	247	1,689
South	19,999	117	3,361
Highest Grade Taught			
1-6	22,152	172	3,614
7-9	22,051	319	1,275
10-12	23,259	134	3,679
Size of District			
1-5 schools	20,592	220	2,018
6-50 schools	22,728	179	3,569
Over 50 schools	24,247	135	2,981
Highest Degree			
Less than Bachelor's	21,441	613	118
Bachelor's	20,188	130	4,237
Master's or More	24,888	146	4,213
Years of Experience			
5 or less	16,165	162	1,126
6 to 10	18,952	156	1,725
11 to 15	22,630	172	2,083
16 to 20	25,677	195	1,665
21 to 25	26,823	177	977
26 to 30	27,499	364	630
More than 30	26,675	403	362

Figure 1

Average primary contract salaries of full-time public school teachers by selected teacher characteristics, 1984-85



and lowest in the South ($19,999). There are also significant differences in average pay among small (1-5 schools), medium-sized (6-50 schools), and large (over 50 schools) school districts. These results make it clear that it is necessary to break down the salaries by geographical area and district size (and perhaps by other locational factors) to obtain a complete picture of teacher salary structures in the United States.

Teachers' salaries depend strongly on experience and training. As shown in table 1, teachers with master's or higher degrees are paid 23 percent more, on average, than teachers with only bachelor's degrees, and teachers with substantial seniority--25-30 years of service--are paid roughly 70 percent more, on average, than teachers in their first 5 years of service ($27,499 and $16,165, respectively).[9] Note, however, that because experience and degree level are correlated (more experienced teachers also tend to have completed more postgraduate education), these broad averages do not yield accurate estimates of the specific influences of experience and training on salary.

Finally, although teacher salaries in the United States are generally not based on level of school or grades taught, average salaries are significantly higher among teachers of high school students (grades 10-12) than among teachers of elementary (grades 1-6) or mid-level (grades 7-9) students. These higher salaries

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[9]The apparent diminution of average salaries at the highest experience level (30 years or more) in table 1 probably reflects the uneven distribution of senior teachers among higher-paying and lower-paying school systems, but there are too few observations of such teachers in the 1984-85 Public School Survey sample and too limited data on district characteristics to determine precisely which aspects of the distribution are most important. In any event, the decline in average pay in the over-30-year experience bracket clearly does not reflect the actual shapes of local salary schedules.

reflect mainly the higher average experience and degree levels of teachers at the high school level.[10]

SALARIES IN RELATION TO EXPERIENCE AND EDUCATION

Almost universally, public school teachers in the United States are paid according to salary schedules based on seniority and amount of education. Extra duty assignments, such as coaching athletic teams, affect salaries slightly. Pay differentials based on teaching performance remain rare, although a few States and localities do operate, or are implementing, merit pay or career ladder systems that link salary to assessed performance. Despite the general uniformity of practice in basing salary primarily on experience and education, the decentralized nature of the U.S. education system makes it difficult to describe an average, or "typical," salary schedule. There are no national and few statewide salary schedules. Instead, pay scales are determined independently, often through the process of collective bargaining, in thousands of local school systems. The 1984-85 Public School Survey makes it possible, however, to estimate average relationships on a national level between salaries and the two key salary determinants, years of experience and highest degree.

Table 2 shows the average salaries paid to teachers with various combinations of experience and education.[11] The single-year figures provide a detailed salary

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[10]Fifty-four percent of teachers of grades 10-12 report that they have master's or doctorate degrees, as compared with 45 percent of teachers of grades 1-6 and 48 percent of teachers of grades 7-9. The average number of years of service is 15.1 among teachers of grades 10-12, as compared with 14.5 and 14.2 among teachers of grades 1-6 and 7-9, respectively.

[11]Teachers who have not earned at least bachelor's degrees are omitted from the table. Only 118 out of 8,568 survey respondents, or 1.4 percent, fall into this category.

TABLE 2

Teachers' Salaries in Relation to Experience and Degree Level, Full-time Public School Teachers: 1984-85

Years of Experience (1-year intervals)	Average Annual Salary: Teachers with Bachelor's Degrees (n = 4,237)		Teachers with Master's Degrees or More (n = 4,213)	
1	$14,757	(318)	$19,426	(2,688)
2	15,000	(209)	18,913	(1,814)
3	15,567	(325)	16,853	(1,157)
4	16,154	(362)	18,804	(1,006)
5	16,706	(355)	17,936	(998)
6	16,916	(348)	18,210	(589)
7	17,668	(483)	19,456	(609)
8	17,910	(391)	20,826	(660)
9	18,543	(391)	21,275	(525)
10	19,233	(347)	20,937	(519)
11	19,807	(445)	22,294	(582)
12	20,017	(513)	23,638	(512)
13	21,810	(486)	23,611	(478)
14	22,398	(442)	24,003	(516)
15	22,113	(689)	25,243	(494)
16	23,952	(582)	25,974	(511)
17	24,169	(568)	26,839	(512)
18	23,847	(728)	27,148	(651)
19	24,141	(608)	27,133	(566)
20	23,914	(657)	27,979	(580)
21	25,019	(824)	28,157	(702)
22	23,422	(702)	27,308	(855)
23	25,095	(985)	28,449	(771)
24	24,925	(879)	27,970	(944)
25	25,411	(1,122)	28,358	(650)
26	25,296	(1,220)	28,785	(936)
27	25,169	(961)	29,733	(803)
28	25,097	(1,951)	29,300	(1,004)
29	25,652	(1,481)	29,805	(987)
30	24,622	(943)	28,040	(1,145)
31	23,784	(1,404)	30,243	(1,339)
32	24,179	(2,859)	29,575	(977)
33	25,967	(1,969)	27,660	(1,271)
34	22,440	(1,382)	29,747	(1,573)
35	24,081	(2,565)	30,155	(1,441)
more than 35	23,290	(1,405)	27,836	(1,368)
(5-year intervals)				
0-5	15,679	(148)	18,251	(620)
6-10	18,021	(179)	20,343	(266)
11-15	21,145	(235)	23,839	(235)
16-20	24,001	(280)	26,947	(253)
21-25	24,717	(401)	28,059	(350)
26-30	25,174	(569)	29,098	(435)
more than 30	23,951	(518)	28,972	(510)

Note: Standard errors are shown in parentheses; n's are unweighted numbers of teachers at each degree level.

experience profile, but since there are few teachers at certain rungs of the experience ladder (especially 20 years and above), some of the salary estimates have relatively high standard errors.[12] In comparison, the salary figures for 5-year intervals are more reliable but allow only relatively coarse distinctions among experience levels. The data on average salaries for 5-year experience intervals are also displayed graphically in figure 2.

The entries in table 2 convey the shape of the teacher salary profile but do not resolve some important quantitative issues. For instance, the average salaries of full-time teachers in 1984-85 ranged from about $15,000 for a new teacher with a bachelor's degree to about $30,000 for a highly experienced teacher with around 30 years of service and a master's or higher degree. Also, salaries increase rapidly with increasing seniority at the outset but eventually taper off and level out. The year-to-year salary differences appear to fluctuate erratically, however, because of sampling variations, making it hard to discern the average pay increment associated with an additional year of experience. Similarly, it is difficult to be precise about the size of the salary increment paid for a graduate degree, since the ratio of the salary paid for a graduate degree to the salary paid for a bachelor's degree varies from one level of experience to another. To clarify these matters, the crosstabular analyses in table 2 and subsequent tables have been supplemented with a series of regression analyses, designed to yield estimates of the relationships between salary and seniority. Selected findings are given here. Details on the regression equations used are provided in "Technical Notes."

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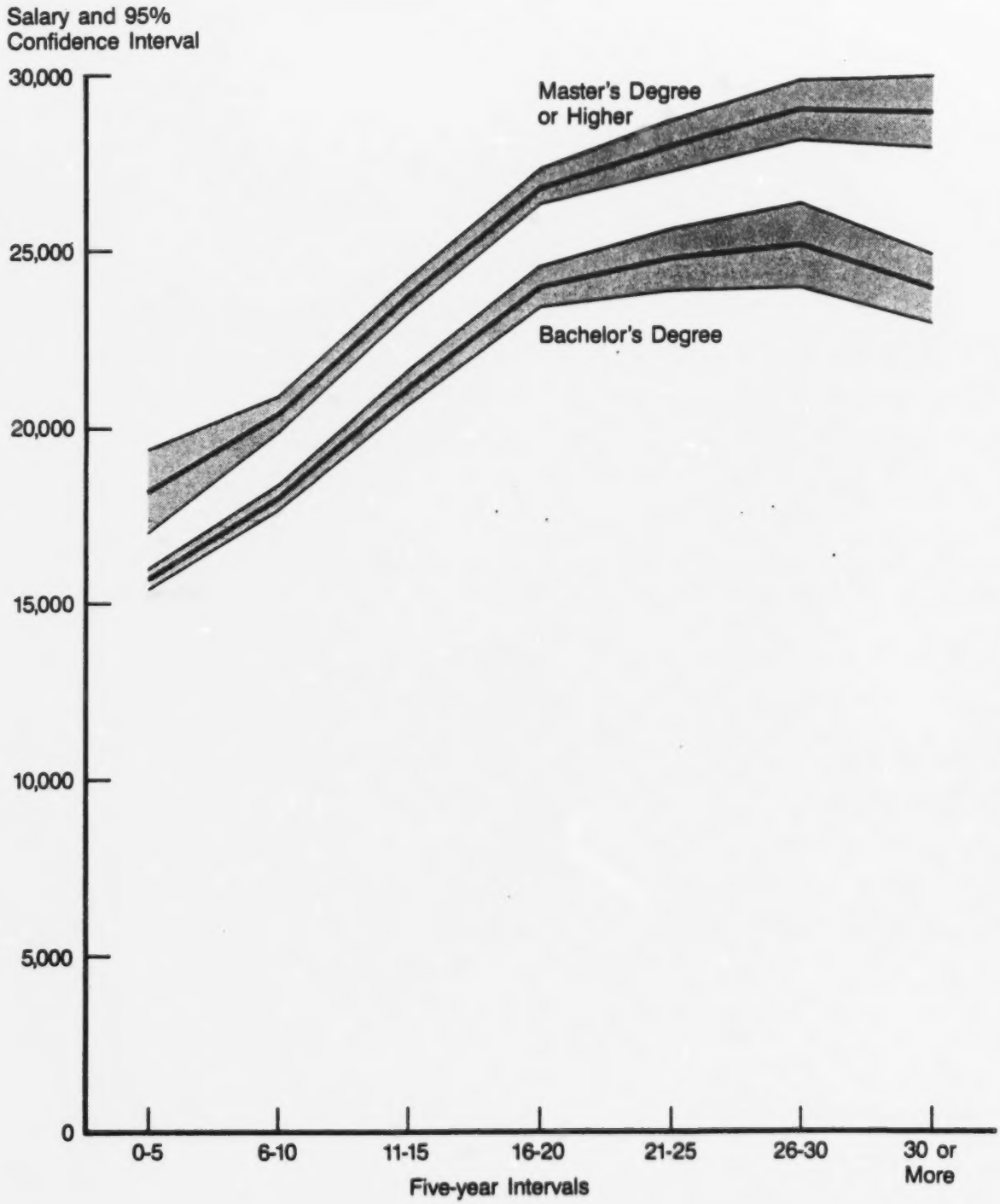
[12]Teachers were asked to report separately the numbers of years during which they served as full-time and as part-time teachers. Information is not available on how years of part-time teaching are treated for the purpose of salary determination, and it is likely that the treatment is not standardized around the country. For the purpose of this analysis, it has been assumed that a year of part-time teaching counts, for salary purposes, as one-half of a year of full-time teaching, and teachers have been classified into experience strata accordingly.

Figure 2

Primary contract salaries of full-time public teachers by years of teaching experience and degree level, 1984-85



According to calculations based on the regression results, the average pay increment for each year of experience during the first 12 years of teaching is approximately $660 for teachers with bachelor's degrees and $770 for teachers with graduate degrees.[13] Based on comparisons of predicted salaries for equally experienced teachers with bachelor's degrees and graduate degrees, the average salary increment associated with a graduate degree is about 10 percent early in the teaching career (5 years of service) and about 14 percent later in the career (20 years of service). Note that these percentages, while substantial, are much smaller than the previously cited 23-percent difference in average pay between teachers with bachelor's and graduate degrees. The explanation for the discrepancy is simple: teachers who have graduate degrees are more experienced, on average, than teachers who only have bachelor's degrees, and consequently a comparison of average salaries between the two groups, uncontrolled for experience, reflects experience-based as well as degree-based salary differentials.

The salary-seniority profiles in table 2 and figure 2 turn downward late in the teaching career (beginning at about 30 years of service for teachers with bachelor's degrees and slightly later for teachers with graduate degrees). This downward trend is certainly not a feature of actual salary schedules, but it would take more detailed data on attributes of specific school districts than are now available to determine precisely which aspects of the teacher distribution account for the downturn phenomenon.

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[13]These estimates are based on regressions fitted to the individual observations of all teachers with bachelor's degrees and all teachers with master's degrees, respectively. Since the fitted salary functions are curvilinear (quadratic), their slopes are not constant. The estimates reported here were obtained by subtracting the predicted salary in year 12 from the predicted salary in year 1 and dividing the difference by 11. Year 12 was picked for this comparison because it is roughly in the middle of the range (10-15 years) in which typical school district salary schedules top out.

It is important to note that neither table 2 nor the regression analysis captures the full relationship between postgraduate teacher education and salary. Local salary schedules typically distinguish not only between teachers with bachelor's and graduate degrees but also among finer gradations of educational attainment. Often, for example, a salary schedule will recognize such levels as B.A. + 30 postgraduate credit hours, M.A. + 30 hours, M.A. + 60 hours, and so forth. The data available in the 1984-85 Public School Survey do not allow us to classify teachers into these more detailed categories. The likely consequences of this loss of detail are (1) some downward bias in the regression estimates of the sensitivity of salary to teacher's education and (2) some confounding of the effects of education and experience on salary, probably resulting in overestimation of the latter.[14]

VARIATIONS IN SALARY PROFILES

Variations of salary profiles by region, sex and race, and district size can be analyzed with data contained in the 1984-85 Public School Survey. Additional analyses would be possible if the survey data were merged with other data on characteristics of school districts (see "Possible Extensions of the Analysis," below).

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[14]The confounding occurs because teachers' educational attainment is positively correlated with seniority (i.e., teachers tend to accrue additional postgraduate credits during their careers). Consequently, some of the salary variation that appears to be due to increasing seniority is actually accounted for by increases in accumulated credit hours not captured by the distinction between teachers with bachelor's and graduate degrees. In particular, the fact that salaries appear to increase with seniority (in table 2) well after the 10-to-15-year experience level at which salary schedules typically level off may be partly explained by this phenomenon.

Interregional Variation

Table 3 presents regional salary profiles for the Northeast, Midwest, West, and South.[15] These profiles show that pay differs by region and that the pattern is not as simple as was suggested by the earlier interregional comparison of mean salaries. For example, it was shown in table 1 that average salaries in 1984-85 were nearly 25 percent higher in the Northeast than in the South. According to table 3, however, the salaries paid to teachers with bachelor's degrees during the first 5 years of teaching are, if anything, higher in the South than in the Northeast. It is only later, as teachers become more senior and earn advanced degrees, that southern salaries fall behind. Evidently, more is involved than simple differences in the levels of pay scales among regions.

Interregional differences in average salaries reflect a combination of several different forms of interregional variation in salary patterns and teacher characteristics. First, the shapes of the salary-experience curves vary among regions. Salaries rise less sharply with experience in the South than in other parts of the country. To illustrate, the following are estimates by region, based on regression equations, of the average increment in annual pay per year of seniority during the first 12 years of teaching for teachers with bachelor's degrees:[16]

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[15]Only 5-year experience intervals are shown in table 3 because there are too few observations to produce usable estimates broken down both by region and by single year of experience.

[16]The regionally disaggregated regressions referred to here have exactly the same form as the national regressions discussed under "Technical Notes," but are fitted to data for regional subsamples of teachers. See table 6, under "Technical Notes," for the numerical regression results.

TABLE 3

Teachers' Salaries in Relation to Experience and Degree Level, by Geographical Region, Full-time Public School Teachers: 1984-85

Years of Experience	Average Annual Salary			
	Northeast	Midwest	West	South
Teachers with Bachelor's Degrees				
0-5	$14,793 (461)	$14,974 (357)	$16,492 (338)	$15,765 (183)
6-10	18,219 (592)	18,212 (363)	19,761 (531)	17,046 (185)
11-15	21,194 (744)	21,272 (469)	23,421 (503)	19,356 (256)
16-20	24,981 (725)	24,390 (518)	25,781 (623)	21,767 (358)
21-25	27,177 (952)	23,752 (839)	26,992 (701)	22,096 (530)
26-30	27,108 (1,638)	24,457 (841)	28,095 (1,001)	21,532 (750)
more than 30	29,953 (904)a	22,294 (627)	24,754 (1,034)	21,717 (682)
	(n = 547)	(n = 984)	(n = 1,000)	(n = 1,706)
Teachers with Master's Degrees or More				
0-5	$19,680 (2,366)a	$17,640 (645)a	$19,307 (1,942)	$17,597 (732)
6-10	20,204 (705)	20,246 (568)	23,055 (764)	19,396 (304)
11-15	25,145 (555)	24,995 (527)	25,968 (605)	21,365 (243)
16-20	28,912 (508)	27,464 (421)	29,464 (705)	23,466 (317)
21-25	30,690 (876)	28,756 (631)	30,150 (669)	24,402 (460)
26-30	31,619 (1,141)	29,039 (671)	30,506 (782)	24,674 (637)
more than 30	32,161 (1,203)	28,012 (569)	30,244 (876)	25,925 (832)
	(n = 871)	(n = 1,078)	(n = 682)	(n = 1,582)

Note: Standard errors are shown in parentheses; n's are unweighted numbers of observations of teachers in the indicated categories.

(a) The number of observations for this cell is less than 30.

$764	Northeast
$744	Midwest
$777	West
$461	South

Seniority is less well rewarded in the South than elsewhere. Second, average seniority also varies among regions. In 1984-85, the average teacher in the Northeast had been teaching for 16.2 years; in the Midwest, 15.3 years; in the West, 14.8 years; and in the South, only 13.6 years. Third, the percentage of teachers with graduate degrees varies among regions: 57.9 percent in the Northeast, 52.4 percent in the Midwest, 37.7 percent in the West, and 45.0 percent in the South. Fourth, the salary premium for an advanced degree also appears to vary regionally. For example, at the 20-year level of experience, the percentage increment in pay associated with a graduate degree averages 16 percent in the Northeast and Midwest, 12 percent in the West, and only 9 percent in the South. This collection of differences appears to explain much of the interregional variation in average pay.

Variations by Sex and by Race

Table 4 gives the salary matrix by sex and two racial/ethnic categories, white non-Hispanics and all other races. The salaries of males are higher than those of females at both degree levels and in all experience brackets; the male/female differences are statistically significant in most but not all cases. These differences are generally smaller than the 12.5 percent male/female difference in average salary reported in table 1, indicating that some of the latter is due to male/female differentials in average experience, training, or both. The salaries of male teachers with bachelor's or graduate degrees exceed those of female

TABLE 4

Teachers' Salaries in Relation to Experience and Degree Level, by Sex and Race, Full-time Public School Teachers: 1984-85

Years of Experience	Average Annual Salary			
	Males	Females	White Non-Hispanics	All Other Races
Teachers with Bachelor's Degrees				
0-5	$16,605 (278)	$15,363 (170)	$15,625 (160)	$16,087 (383)
6-10	19,099 (315)	17,660 (213)	17,967 (194)	18,340 (466)
11-15	22,301 (371)	20,703 (295)	21,063 (260)	21,763 (518)
16-20	25,013 (492)	23,580 (337)	24,243 (317)	22,530 (556)
21-25	25,040 (581)	24,582 (535)	25,027 (458)	23,229 (784)
26-30	26,808 (857)	24,451 (725)	25,385 (677)	24,413 (1,011)
more than 30	27,251 (908)	22,963 (560)	24,079 (565)	22,938 (984)a
	(n = 1,343)	(n = 2,894)	(n = 3,550)	(n = 687)
Teachers with Master's Degrees or More				
0-5	$19,468 (1,320)	$17,931 (686)	$18,168 (704)	$19,112 (832)a
6-10	21,151 (428)	20,041 (331)	20,329 (290)	20,425 (675)
11-15	25,028 (329)	23,269 (313)	23,838 (261)	23,845 (532)
16-20	27,772 (345)	26,356 (358)	27,198 (271)	25,041 (660)
21-25	29,063 (430)	27,431 (539)	28,520 (384)	25,258 (758)
26-30	30,422 (561)	27,578 (639)	29,440 (482)	26,732 (922)
more than 30	30,387 (643)	27,786 (739)	29,107 (549)	28,369 (1,335)
	(n = 1,762)	(n = 2,451)	(n = 3,526)	(n = 687)

Note: Standard errors are shown in parentheses; n's are unweighted numbers of teachers in the indicated categories.

(a) The number of observations for this cell is less than 30.

teachers with the same degrees by 6 to 8 percent throughout the range of 5 - 25 years of experience.[17]

The male/female differences that remain after controlling for experience and degree level are difficult to explain. Since school district pay scales do not discriminate by sex, male-female pay inequality must be accounted for by some combination of factors such as (a) differences in distributions of males and females among higher paying and lower paying school systems (i.e., higher percentages of males in higher paying districts), (b) differences in rates of assignment to duties that bring extra pay, such as coaching athletic teams, (c) differences in educational attainment (postgraduate credit hours) not captured by the graduate degree variable, and possibly (d) differences in rates of career interruption, which could leave female teachers lower on salary scales than their cumulative experience suggests. It may be possible to explain this by further analyzing the 1984-85 Public School Survey data; however, additional data would be required for a full resolution of the issue.

The last two columns of table 4 present salary profiles for white non-Hispanics and for all other races. Significant differences between the groups emerge only after 15 years of experience. Up to that point, the salary entries in the table are higher for minority teachers than for white non-Hispanics, but the differences are not statistically significant. In the higher seniority brackets, the differences are in favor of the white non-Hispanics and are statistically significant in most but not all cases. Consistent with these findings from the crosstabulation, the regression analysis shows that salaries of minority teachers rise less rapidly with experience than do salaries of white non-Hispanic teachers.

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[17]These estimates are based on predicted values from regression equations of the quadratic form described earlier and detailed in the technical notes, fitted separately to the data for male and female teachers.

For instance, the average salary increment per year of experience for white non-Hispanic teachers with bachelor's degrees during the first 12 years of teaching is about $680, whereas the corresponding increment for all other races is only $570.[18] Thus, the salaries of white non-Hispanics eventually outpace those of minorities.

The most plausible source of these salary differentials is differences in the spatial distributions of the majority and minority teachers. That is, the former are probably more concentrated in places where seniority is more heavily rewarded, for example, higher paying States and urban areas. Further analyses of the 1984-85 Public School Survey data may help to identify the relevant categories of places, but additional data, for example, on levels of school spending in the districts where teachers are employed, would be needed for a thorough analysis.

Variations by Size of District

Finally, table 5 shows the salary profiles by size of district, distinguishing among small districts (1 - 5 schools), medium-sized districts (6 - 50 schools), and large districts (more than 50 schools).[19] Salaries tend to increase with district size, even though the differences between size categories are not statistically significant for all combinations of years of experience and academic degree. For example, the average salary of teachers with bachelor's degrees and 15 years of experience is 7 percent higher in a medium-sized than in a small district ($22,501, as compared with $21,069) and 12 percent higher in a large district ($23,694).

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[18]The regressions are of the same quadratic form as described earlier and detailed in the technical notes, but fitted to samples of white non-Hispanic and minority teachers. The estimates cited are the average annual increments in predicted salary between the first and twelfth years of teaching.

[19]Size is represented by number of schools because a district enrollment variable is not included in the 1984-85 Public School Survey data base.

TABLE 5

Teachers' Salaries in Relation to Experience and Degree Level, by Size of District, Full-time Public School Teachers: 1984-85

Years of Experience	Average Annual Salary: Small Districts (1-5 Schools)		Medium-Sized Districts (6-50 Schools)		Large Districts (Over 50 Schools)	
Teachers with Bachelor's Degrees						
0-5	$14,969	(242)	$15,942	(186)	$16,251	(213)
6-10	17,059	(297)	18,246	(196)	19,199	(333)
11-15	20,115	(353)	21,381	(282)	22,322	(340)
16-20	22,593	(588)	24,246	(380)	25,403	(313)
21-25	22,800	(615)	24,819	(449)	26,431	(481)
26-30	22,171	(819)	25,813	(587)	27,191	(707)
more than 30	21,407	(900)	24,588	(707)	25,815	(955)
	(n = 1,148)		(n = 1,756)		(n = 1,333)	
Teachers with Master's Degrees or More						
0-5	$17,849	(806)	$18,280	(689)	$19,319	(975)
6-10	19,016	(403)	20,402	(297)	21,557	(317)
11-15	21,835	(519)	24,017	(279)	25,574	(326)
16-20	25,513	(489)	26,859	(353)	28,740	(358)
21-25	26,453	(1,021)	27,930	(456)	29,938	(370)
26-30	28,281	(1,079)	29,209	(502)	29,622	(505)
more than 30	26,815	(1,194)	29,186	(753)	29,688	(654)
	(n = 843)		(n = 1,762)		(n = 1,608)	

Pay scales are generally higher in metropolitan centers, where districts are likely to be large, than in rural areas, where they are likely to be small. However, the correspondence between district size and metropolitan or urban location is far from perfect. For example, districts in the South are often coterminous with counties, which means that they can be large even when the areas they serve are mainly rural, whereas suburban districts are sometimes small even in populous areas. It is likely, therefore, that district size serves as a rough proxy for other variables more directly related to levels of teachers' salaries such as size of market area and urban, suburban, or rural location.

POSSIBLE EXTENSIONS OF THE ANALYSIS

At least three avenues of further inquiry seem worth pursuing to produce a more comprehensive picture of salary structures and factors related to them. First, the analysis can cover additional variables associated with salary differences. For instance, it is possible, using the 1984-85 Public School Survey teacher and administrator questionnaires, to relate salaries to such factors as percentage of minority enrollment (at the school level), and teacher's subject area assignment. In addition, data can be separated into groups of States other than the four regions. For instance, breakdowns by State income or other economic characteristics of States might be of interest.

Second, several analyses of high policy relevance would become feasible if data from the 1984-85 Public School Survey were merged with other data files containing school district characteristics, such as the CES Common Core of Data (CCD). For example, such mergers might allow investigation of relationships between salaries and district enrollment; district wealth, income, or per pupil expenditure; or urban, suburban, or rural location. Such analyses would be useful

for documenting salary disparities, examining influences on salary scales, and analyzing fiscal and other consequences of proposed salary reforms.

Third, extensions of the econometric analysis, beyond the simple regressions presented here, could yield richer findings about salary structures and influences upon them. The econometric characterization of teacher salary profiles might be extended to take into account special-duty assignments and the composition of teaching experience, for example, by distinguishing between in-district and out-of-district and between in-State and out-of-State experience. Multivariate methods could be used to quantify relationships among locational, financial, and other relevant attributes of districts and the levels and shapes of salary scales. This analysis of influences on teacher salaries can only be accomplished through the introduction of more complex econometric techniques.

TECHNICAL NOTES

1. The 1984-85 Public School Survey

The Public School Survey was conducted by mail during the late winter and spring of 1985. Information was requested from a nationally representative sample of 2,801 schools and 10,650 of their teachers. The school-level information, obtained from school administrators, included data on enrollment, minority enrollment, staffing, use of aides and volunteers, teacher incentive programs, computer use, advanced placement programs, and other topics. The information requested from teachers included items on the use of teacher time, teacher training and experience, current teaching assignments, use of paid aides and unpaid volunteers, amount of homework assigned, and teacher salaries. This bulletin is based on responses to selected items from the teacher questionnaire.

The sample of schools was selected from the Center for Education Statistics Common Core of Data (CCD) universe of public elementary and secondary schools. As the first step in the sampling procedure, nine strata of schools were defined, based on three school types (elementary, secondary, and other) and three categories of district size (1 - 5 schools, 6 - 50 schools, and over 50 schools). Sample schools were selected independently within each stratum with probability proportional to the square root of each school's full-time-equivalent number of teachers. Samples of teachers were selected from lists supplied by the schools and were stratified by elementary teachers, teachers of science or mathematics, and others. Approximately four teachers were selected from each school.

Survey mailings began in February 1985 and continued into the late spring of 1985. Followup efforts included additional questionnaire mailings and telephone prompts. The school administrator and teacher surveys were closed out in June with

response rates of 84.6 percent and 80.0 percent, respectively. Approximately 11 percent of the teacher sample could not be linked to the sample of schools.

2. Weighting of Observations

The sample design is such that the probability of selection varies among categories of teachers and schools. These unequal probabilities must be taken into account in the analysis by weighting each observation appropriately; otherwise, some types of teachers and schools would receive more or less weight than is warranted by their representation in the population, and the results would not be typical of the Nation as a whole. All estimates in this bulletin, including estimates of standard errors, are based on weighted computations in which the weights reflect the sampling probability associated with each observation.

3. Variable Definitions

The following definitions link each variable used in this analysis to the corresponding item(s) on the teacher questionnaire:

Primary contract salary: the amount reported in response to item 21, "What is the annual salary you receive for your primary contract? Annual salary: $ _____"

Basic contract salary plus supplemental contract salary: the sum of the primary contract salary (see above) plus the amount reported in response to item 25, "What is the total salary you have received or expect to receive during the 1984-85 school year for activities under the additional or supplemental contracts? Total salary: $ _____"

Years of experience: length of time computed from parts (a) and (b) of item 8, "How many years of elementary/secondary school teaching experience in public and private

schools will you have completed at the end of this school year? (Exclude practice and substitute teaching. Count each year in which you did any part-time teaching or taught for only part of the year as one year of part-time teaching experience.)

a. Years of full-time teaching experience _____

b. Years of part-time teaching experience _____"

(For the purpose of this analysis, experience is defined as the sum of the number of years of full-time experience (8a) and one-half of the number of years of part-time experience (8b).)

Highest degree earned: the choice selected in response to item 1, "Mark the box below for the highest academic degree you have earned. (Do not include honorary degrees.)

1. No degree
2. Associate degree
3. Bachelor's
4. Master's
5. Doctorate"

The few teachers who selected responses 1 and 2 were generally excluded from the analyses. Teachers with doctoral degrees, also a very small percentage of respondents, were combined with teachers with master's degrees to form the category, "master's degree or more."

Region: one of the Census Bureau's four-region State groupings--Northeast, Midwest, West, or South--according to the State in which the schools are located.

Sex: the response to item 34, "What is your sex?

1. Male
2. Female"

Race/Ethnicity: the response to item 33, "To which one of the following racial/ethnic groups do you belong? (Check one.)

1. American Indian or Alaskan Native
2. Asian or Pacific Islander
3. Black (not of Hispanic origin)
4. White (not of Hispanic origin)
5. Hispanic"

For some purposes, those who indicate responses 1, 2, 3, and 5 have been grouped into a single "all other races" or "minority" category.

District size: the class into which the district is classified according to the number of schools it operates: small (1 - 5 schools), medium (6 - 50 schools), large (over 50 schools).

Highest grade taught: the highest grade reported in response to item 14a or 14b, each of which requests teachers to identify the classes they teach by grade level and other attributes (items too lengthy to be reproduced here). Respondents were grouped into three grade-level categories: elementary (1 - 6), middle (7 - 9), and high school (10 - 12).

4. Accuracy of Estimates

The estimates presented in the tables are based on samples and are subject to sampling variability. Caution should be exercised in interpreting statistics based on relatively small numbers of cases as well as in interpreting small differences between estimates. If the questionnaires had been sent to different samples, the responses would not have been identical; some numbers might have been higher, others lower. The standard errors in the tables provide indications of the accuracy of each teacher salary figure. If all possible samples of the same size

were surveyed under identical conditions, a range of plus or minus one standard error about the estimate would include the "true" population value of the variable in about two-thirds of the cases; a range of plus or minus two standard errors would include the population value about 95 percent of the time. Note, however, that the standard errors in the tables do not take into account the effects of biases due to nonresponse, measurement error, processing error, or other systematic error that could occur even in a complete ("universe") survey.

5. The Regression Analysis

Regression equations have been fitted to the salary and experience data reported by individual respondents to the 1984-85 Public School Survey teacher questionnaire. Because the relationship between salary and seniority is curvilinear (the salary function levels off as experience increases), these equations are quadratic rather than linear. Each has the form,

$$SAL = a_0 + a_1EXP + a_2EXP^2,$$

where SAL is the teacher's salary and EXP is experience. The coefficient of the quadratic term, a_2, is always negative, indicating that the size of the annual pay increment for experience diminishes at higher experience levels. Separate equations, 24 in all, were estimated for all teachers with bachelor's degrees, all teachers with master's or higher degrees, and subcategories of both, disaggregated by geographical region, sex, race, and district size. The results were used to estimate pay increments associated with both additional years of experience and higher degrees.

The regression equation for all teachers with bachelor's degrees will serve as an illustration. This equation is:

$$SAL = \underset{(163)}{12{,}882} + \underset{(23.0)}{851.4(EXP)} - \underset{(0.68)}{14.7(EXP)^2}, \qquad R^2 = 0.42, \quad N = 4{,}237$$

where SAL is primary contract salary and EXP is years of experience. The figures in parentheses are standard errors of the estimated regression coefficients. The fraction of variance in SAL explained by the regression equation (R^2) is .42, and the number of observations to which the equation was fitted (N) is 4,237. The coefficients in this equation are significantly different from zero at least, at the .0001 level of probability.

The same items of information for all other regression equations alluded to in this bulletin are presented in table 6. All equations have the same quadratic form as indicated above, and all regression coefficients with a single exception indicated in the table are significantly different from zero at the .0001 probability level. Table 6 also shows in the last column the estimated average salary increment per year of seniority between the first and twelfth years of teaching, calculated as described below.

Predicted salaries at particular experience levels are derived simply by substituting the specified number of years of experience into the regression equation. For example, the estimated average salary of teachers with bachelor's degrees and 15 years of experience is $12,882 + 851.4(15) - 14.7(15)^2$, or $22,346. The estimated salary increment per year of experience at a specified experience level is given by the slope of the salary-experience curve, $a_1 - 2a_2(EXP)$. For instance, the estimated slope at the 8-year experience level is 851.4 - 2(14.7)(8), or $616. The experience increment reported in the text is not this point estimate, however, but rather the average annual increment paid for experience during the first 12 years of teaching. This is computed simply by dividing the difference between the predicted year 12 and year 1 salaries by 11. Thus, for the

TABLE 6

Salary-Seniority Regression Equations: Parameter Estimates, Related Statistics, and Average Salary Increments per Year of Seniority, Selected Categories of Teachers

Category of Teachers	Regression Coefficients and (Standard Errors) Intercept	EXP	EXP SQ	R SQ	Sample Size (N)	Average Increment in SAL per Year of EXP (Yrs 1-12)
All Teachers with BA	$12,882 (163)	851.4 (23.0)	-14.7 (0.7)	0.42	4,237	$660
All Teachers with MA or More	14,051 (335)	964.6 (38.2)	-15.1 (1.0)	0.29	4,213	768
Disaggregation by Region:						
Teachers with BA						
Northeast	11,892 (546)	913.0 (73.5)	-11.5 (2.2)	0.53	547	764
Midwest	12,024 (326)	996.2 (44.4)	-19.4 (1.3)	0.46	984	744
West	13,464 (351)	1,024.0 (47.5)	-19.0 (1.3)	0.45	1,000	777
South	13,788 (189)	561.9 (29.0)	-9.2 (0.9)	0.38	1,706	442
Teachers with MA or More						
Northeast	12,296 (894)	1,280.6 (98.6)	-20.8 (2.5)	0.35	871	1,010
Midwest	13,126 (640)	1,164.0 (70.9)	-20.8 (1.8)	0.33	1,078	894
West	16,414 (758)	950.3 (85.2)	-15.1 (2.2)	0.31	682	754
South	15,600 (395)	545.3 (47.5)	-7.1 (1.3)	0.24	1,582	453
Disaggregation by Sex:						
Male Teachers with BA	14,024 (318)	795.8 (46.1)	-12.0 (1.4)	0.43	1,343	640
Female Teachers with BA	12,611 (188)	846.1 (26.4)	-14.9 (0.8)	0.42	2,894	652
Male Teachers with MA or More	15,187 (573)	942.8 (61.8)	-14.3 (1.5)	0.28	1,762	757
Female Teachers with MA or More	13,909 (414)	937.9 (48.6)	-15.2 (1.3)	0.27	2,451	740

TABLE 6 (continued)

Salary-Seniority Regression Equations: Parameter Estimates, Related Statistics, and Average Salary Increments per Year of Seniority, Selected Categories of Teachers

Category of Teachers	Regression Coefficients and (Standard Errors) Intercept	EXP	EXP SQ	R SQ	Sample Size (N)	Average Increment in SAL per Year of EXP (Yrs 1-12)
Disaggregation by Race:						
White Non-Hispanics with BA	$12,725 (175)	869.0 (24.6)	-14.8 (0.7)	0.44	3,550	$677
Black, Hispanic, and Other Races with BA	13,828 (447)	753.2 (65.8)	-14.1 (2.0)	0.33	687	570
White Non-Hispanics with MA or More	13,703 (361)	1,014.3 (41.5)	-16.0 (1.1)	0.32	3,526	806
Black, Hispanic, and Others with MA or More	16,769	596.3	-7.9 *	0.17	687	494
Disaggregation by LEA Size:						
Teachers with BA						
LEAs with 1-5 Schools	12,195 (280)	827.1 (38.7)	-15.7 (1.1)	0.39	1,148	623
LEAs with 6-50 Schools	13,343 (258)	807.0 (36.8)	-13.1 (1.1)	0.42	1,756	637
LEAs with More than 50 Schools	13,467 (296)	909.8 (42.7)	-15.2 (1.3)	0.49	1,333	712
Teachers with MA or More						
LEAs with 1-5 Schools	13,687 (698)	838.5 (86.4)	-12.1 (2.5)	0.29	843	681
LEAs with 6-50 Schools	14,307 (528)	936.7 (59.7)	-14.3 (1.5)	0.29	1,762	751
LEAs with More than 50 Schools	14,350 (530)	1,120.3 (57.6)	-19.4 (1.4)	0.32	1,608	868

Notes:

1. All regression equations have the form SAL = a + b(EXP) + c(EXPSQ), where SAL is salary and EXP is years of experience. All regression coefficients are significantly different from zero at the .0001 probability level, except that the coefficient indicated by * is significantly different from zero at the .001 level.

2. The entry in the last column, average increment in salary per year of experience (years 1-12) is computed as the difference between the year 12 salary and the year 1 salary predicted from the regression equation, divided by 11.

illustrative equation shown above, the estimate is (851.4(12 - 1) - 14.7(12^2 - 1^2))/11, or $660.

6. Tests of Statistical Significance

All statements about comparative magnitudes in this bulletin have been subjected to tests of statistical significance. The specific test varies according to the nature of the comparison. Statements about differences between mean salaries of different teacher categories have been subjected to standard t-tests of the significance of differences between means. The threshold value for confirming significance at the .05 level of probability is t = 1.96. Statements about differences in predicted salaries from regression equations have been subjected to tests based on standard errors of estimate of the predictions. These standard errors of estimate are calculated as appropriately weighted sums of the standard errors of the parameters of the regression equations in question. Similarly, statements about differences in average regression slopes are based on standard errors of estimate of those slopes, also computed as appropriately weighted averages of the pertinent regression parameters.

FOR MORE INFORMATION

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